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THE SADSBURY STEATITE.

BY THEODORE D. RAND.

Under this name I purpose describing outcrops of steatitic rocks most conspicuously exposed in West Sadsbury Township, Chester County, Pa., in the adjoining township of Sadsbury, Lancaster Co., and less so in Valley, West Caln and West Brandywine Townships, Chester Co. These, though known to archæologists, seem to have escaped the notice of geologists, though known locally and made use of in the building of lime-kilns, and in the lining of iron furnaces. Long anterior to this use, they were evidently of value to the aborigines, whose tools are still to be found at the outcrops, together with fragments of vessels manufactured by the Indians from the steatite.

My attention was directed to these exposures by Mr. Harry Wilson, of Gum Tree, Chester Co., who had visited the localities in the study of archæology, and who kindly took me to the most prominent outcrops.

North of the Cambrian sandstone, which forms the mass of the prominent North (Chester) Valley Hill, is a peculiar rock, often resembling a pegmatite, often a very feldspathic gneiss or schist, occasionally a hornblende or a mica schist. North of this is a very heavy bedded, hard, highly crystalline gneiss, that recognized in this portion of Pennsylvania as the most ancient gneiss, probably of Laurentian age, identical with that of the Highlands of New Jersey and with that of the ridge which extending southwestward from near Trenton, N. J., to near Willow Grove, and there bifurcating, sends its southerly arm southwestward through Montgomery, Delaware and Chester counties to North Brook, five miles southwest of West Chester, and its northerly through northern Chester County, where it widens greatly. It is this northerly arm which is referred to above. In all its extent the rock is very compact and hard unless decomposed, highly crystalline, rarely, if ever, schistose, except from decomposition, and usually showing the characteristic blue quartz.

On the contrary, the rock next north of the Cambrian sandstone is sometimes schistose, and while often gnesssic, is not nearly so densely crystalline. The quartz is usually colorless or white. The rock varies greatly, though the quartz—orthoclase variety, of coarse texture, is most abundant. While, as a whole, differing from any other gneiss of southeastern Pennsylvania, it is more unlike the ancient gneiss than it is unlike those southeast of the Trenton—North Brook ridge, that is the gneisses of Rogers' first belt, Mr. Hall's Philadelphia and Manayunk schists and gneisses. To the last, as a whole, the resemblance is not close, but the rock of some strata in each bear a resemblance. It is the rock referred to by Dr. Frazer as "a rock of doubtful signification called alternately conglomerate, feldspar porphyry, etc." (C^4, p. 221.) Although Dr. Frazer in his text differentiates this rock,[1] on the map, it as well as the schists between the Cambrian and the limestone are colored the same as the ancient gneiss, though Dr. Frazer questions whether it is not really lower Cambrian.[2]

At Valley Forge and eastward there is in the same relation to the Cambrian sandstone a coarse conglomerate of pebbles chiefly of bluish and pinkish quartz, which has been referred with little doubt to the lower Cambrian. Could we be sure that this quartz feldspar rock represents the conglomerate, a point would be gained, but inasmuch as they are extremely unlike, although exposed within five or six miles of each other, I think we need proof of their identity. The best exposure is along the west branch of the Brandywine, north of Coatesville, where they dip quite irregularly, but with a prevailing southeast dip of 70° and upwards.

As this rock resembles closely no other southeast of the red sandstone, and occurs, so far as I am aware, only in Chester County and the adjoining county of Lancaster, I propose for it provisionally the name of the Chester County gneiss.

It is in this gneiss that most, if not all, of the outcrops of the Sadsbury steatite occur, and apparently in two lines somewhat irregular.

The easternmost outcrop of the northerly line is on the farm of Mr. Thomas H. Windle,[3] on the left bank of the West Branch of the Brandywine, in West Brandywine Township, about half a mile N. 55° E. of Wagontown. There are large, loose masses, some of them of a schistose variety of the gneiss, containing apparently hornblende and mica, and not soft, and others of similar appearance, but soft enough to be cut readily with a knife, a steatite. No fast rock was visible. To the north of it a hard, heavy bedded hornblende gneiss occurs. I was informed by Mr. Windle that considerable quantities of steatite have been obtained from this point, and used in the furnaces at Coatesville.

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[1] Second Geol. Surv. Penna., vol. C^4, pp. 221, 225, 228, 257, 263.

[2] C^4, pp. 257, 258.

[3] I am under obligations to Mr. Windle for aid in this investigation.

The next locality is a half mile or less N. 75° W. of Wagontown, or a little over three-fourths of a mile due west from the Windle outcrop. These measurements and orientations are estimated from the township map published by Breou, 1883, but a sighting of the localities on the ground by compass (magnetic variation allowed for) gave the direction N. 65 E., an inexplicable difference of 25°. This emphasizes the need of an accurate topographical map like that of the New Jersey survey.

This locality, on the farm of Abraham Brubaker, is immediately north of the Lancaster road which passes through Wagontown (not the Lancaster Pike, an approximatively parallel road a mile and a half to the southward). An area of several acres of ploughed land is strewn with numerous masses of steatite, mostly of small size, while occasional fragments of basins and pots, and more rarely picks made from trap rock give evidence that the red man had a workshop here. No rock certainly in place was seen in this field, but a resident informed me that forty years ago a quarry of soapstone was wrought at this place, out of which large blocks were taken for use in furnaces. With the steatite are small masses of schistose gneiss, also quartz, some of it containing tourmaline. In the steatite octahedral crystals of magnetite occur rarely.

On the westerly edge of this field is a ridge of loose sandstone rock only fifteen or twenty feet wide, looking as if hauled and dumped along a fence line, but the size of the slabs, and their similar orientation, showed that they had not been moved far, or by other than natural forces. A few hundred feet to the westward there appeared a high, steep ridge of Cambrian sandstone, precipitous on its southern side. The rock at Brubaker's is evidently the eastern termination of this ridge of sandstone, as it does not appear on the Brandywine in the line of strike. It apparently extends westward to Compassville, being known further west as Sandy Hill.[4] On the north side of this ridge the highly crystalline, hard, older gneiss appears, and in it, as usual, considerable trap, an outcrop of which appears about three-eighths of a mile north of the ridge, and about a half mile north of West Caln Meeting-house.

The next outcrop of the northern series is on the farm of William Paxson on the Philadelphia and Lancaster turnpike in West Sadsbury Township, near the northwest branch of the Octorara Creek. It is very insignificant and poorly exposed. On the Breou map it is five miles S. 70 W. from the Brubaker outcrop.

The easternmost outcrop of the southerly line is also poorly exposed and insignificant. It is in Valley Township on the farm of E. S. Umstead, one mile N. 70 W. from Coatesville and about a mile and a half nearly south of the Windle outcrop.[5]

The next is also in Valley Township. It is on the farm of William Hoofman, about a mile N. 45 E. of Pomeroy and two miles S. 65 W. from the first. There is a large amount of the rock here strewn in fragments over the surface. One mass only was apparently in place, striking N. 65 E., the dip uncertain. Here cubic crystals of probably limonite pseudomorph after pyrite were found. The steatite is in smaller masses, softer, and apparently more nearly approaching pure talc than at the other localities.

The third is the most extensive of these outcrops. It is in West Sadsbury Township, five miles S. 85 W. from the second, and a mile and a half N. 7 W. from Atglen. Here, on the Strasburg road, is the Swan Tavern. North of it the Chester County gneiss is exposed[6] and beyond this, the steatite, a short distance south of the Swan Public School. The steatite, here accompanied by chlorite and a very compact rock of a dull bluish color, soft but very tough, is in great quantity but wholly in loose masses. On the road to Atglen, south of the schoolhouse, a white fine-grained, highly feldspathic gneiss dips N. 30 E. 60°; an anomalous dip if the rock is in place, as it appears to be. Very close to this are two depressions out of which soapstone is reported to have been quarried. Mr. Wilson informed me that basins of Indian manufacture were found here in comparative abundance.

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[4] This prominent sandstone hill is not shown on the map in C⁴, though mentioned in the text on page 262 (Wagonville being evidently a typographical error for Wagontown) and on p. 20, where it is referred to as an eastern extension of Copper Mine Ridge, though on p. 161 it is included in the gneiss area.

[5] This is in the area colored yellow on the map in C⁴, where this color (representing the sandstone or quartzite) is widened suddenly and greatly after an equally great narrowing northwest and north of Coatesville. If the typical Cambrian sandstone is indicated my observations would not agree with this widening, while if the Chester County gneiss is intended to be included they would not agree with the narrowing.

[6] C⁴, p. 270.

At the school a public road runs nearly east. Along this, on both sides for a quarter of a mile, and then on the north side the steatitic and serpentine rocks abound, but none were seen certainly in place. With these was much gneissoid rock and rusty quartz, also in loose masses. A mile east of this a large mass of steatite is visible in the road, and I am informed that it occurs a half mile farther east on the Limestone road, the dividing line between the townships of Sadsbury and West Sadsbury.[7]

Between a quarter and a half mile north of the steatite the older gneiss is visible in a road running north between two branches of the Octorara.

The fourth and westernmost of the southerly outcrops is the one which has furnished probably the greatest variety and number of specimens of Indian handiwork, their quarries being still partially visible. It is situated on the farm of George Williams, in Sadsbury Township, Lancaster County, about one mile west of Christiana, and three miles S. 70 W. from the Swan outcrop. The only adjacent rock visible is a feldspathic gneiss of the Chester County variety. This is shown in numerous loose masses in a line nearly northeast from the steatite outcrop. The steatite is strewn in fragments, some of them quite large, over an area of several acres, and there are two places where quarries evidently existed but which have been used as dumping grounds for the adjacent rock. In these, I am informed, the rock in place was exposed.

The steatite from all these localities is much alike, generally schistose, quite soft, though impure and containing a large number of small cavities as if from the weathering out of a contained mineral. No crystalline form was observed in the cavities, they often contain ferric oxide. The particles of talc are usually comparatively large and irregular, making the rock, on a casual inspection, resemble a mica schist more than the talc schists of the Lafayette steatite. The color is usually dull gray, more rarely greenish. Except at the Swan outcrop it is not visibly accompanied by serpentine. At

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[7] West Sadsbury was set off from Sadsbury in 1878. The dividing line is the Limestone road, an old Indian trail and an important highway, which is the west line of the borough of Parkesburg.

Christiana it contains garnets, at Brubaker's magnetite, and at Hoofman's altered pyrite. At Hoofman's, in small quantity, is a cryptocrystalline variety, very soft, very pale green, nearly white in color, and resembling the talc schist of Lafayette. At the Swan outcrop chlorite in large folia occurs, also a rock apparently one of the hornblende family changing into steatite or chlorite.

At the Windle outcrop the masses of steatite so closely resemble the adjacent masses of schistose gneiss that one is in doubt until he tests for hardness, and there appears to be a gradation from the very hard to the very soft rock.

I have stated that these outcrops are in the Chester County gneiss, but to this the William Paxson outcrop may be an exception. There is an outcrop of the ancient gneiss to the southwest of it. The exposures do not suffice to indicate much more than its certain existence.

There is one other outcrop of steatite to which my attention was called by Mr. Windle, further north than any of those already mentioned and apparently isolated. It is on the farm of Samuel Holmes, and on the south branch of Birch Run, an affluent of the west branch of the Brandywine, in West Caln Township, Chester Co., and is in the course of the ancient gneiss, which ranges north of the sandstone, north of the Chester County gneiss, in West Caln. As usual the exposure is poor, consisting of but a few loose masses of steatite, with masses of schistose gneiss resembling it in appearance.

Perhaps the most striking feature at all these outcrops, considered in relation to those on the southerly side of the valley is the rarity of serpentine. At all other steatite outcrops in S. E. Pennsylvania of which I have knowledge serpentine rocks abound, and the steatite rocks are subordinate, except perhaps in the Lafayette steatite belt, but in it serpentine is abundant though the steatite predominates. In these outcrops north of the valley, however, serpentine is quite rare, being found at the Swan outcrop only. The resemblance of the steatite to the gneiss found with it is very similar to the occurrence at Chestnut Hill, north of Easton, Pa.,[8] and my observations lead me to the conclusion that the genesis is the same in both instances, the alteration of a gneiss containing probably a large proportion of a magnesian mica, and this perhaps derived from the hornblende, as is certainly the case on the Schuylkill, above Girard Avenue Bridge, Fairmount Park, Philadelphia.

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[8] Proc. A. N. S. Phila., Mar. 25, 1890, p. 95.